Unit 3

Measuring Length

Essential Questions

- How can we estimate and measure the lengths of objects?
- How can we represent and solve story problems involving measurement?
- How can we represent measurement data in a line plot?

Unit Story: What Orson Imagined

You can read the Unit Story with your student by visiting the Unit Story page on the Caregiver Hub.

Unit Investigation

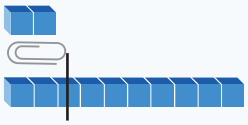
Lesson 1 is the Unit Investigation. Students write and follow directions for how to draw a copy of a specific rectangle to build curiosity and apply their own knowledge in a variety of ways. Use the **Caregiver Connection** to help students continue to explore the math they will see in the unit.

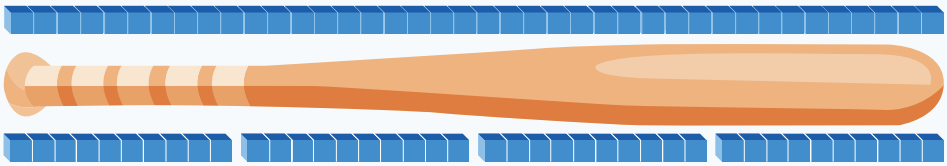
Caregiver Connection

Students may enjoy partner drawing at home. Each person could describe a shape or drawing, including measurements, and then exchange directions to see how well they can replicate it. Encourage students to revise their directions using more precise language as needed.

Summary | Lesson 2

A **centimeter** is a standard length unit in the metric system. You can choose which tools you use to measure length. You can use longer measurement tools to measure short and long objects.





Try This

For Problems 1 and 2, use the picture of the pencil.
Fill in the sentence.

1 Use centimeter cubes to measure the length of the pencil.

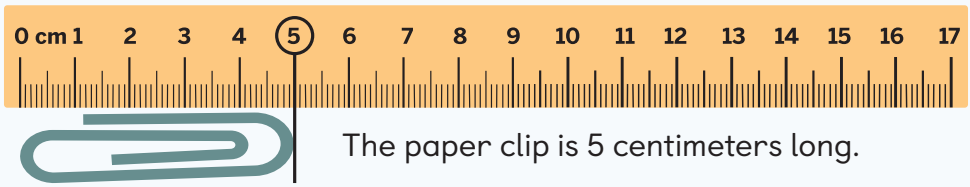
The pencil is _____ centimeters long.

2 Use 10-centimeter rods to measure the length of the pencil.

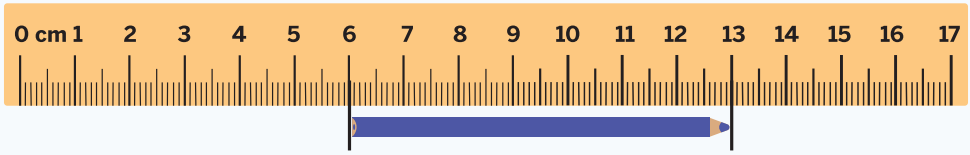
The pencil is _____ centimeters long.

Summary | Lesson 3

The lengths of objects can be compared in different ways. You can use a **ruler** to find the length of an object by lining up the edge of the object with the 0 on the ruler or by counting the number of length units between the endpoints of the object.



The paper clip is 5 centimeters long.



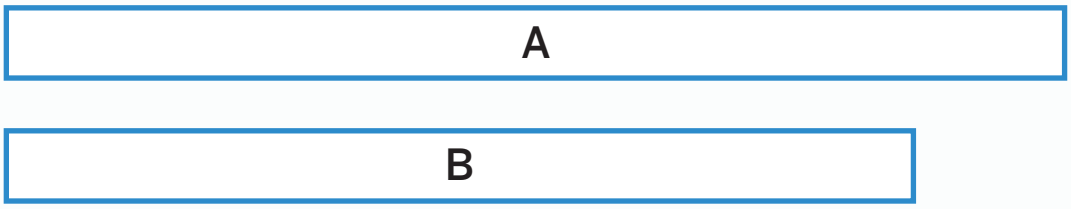
13 − 6 = 7

The colored pencil is 7 centimeters long.

The colored pencil is 2 centimeters longer than the paper clip because 7 − 5 = 2.

Try This

For Problems 1 and 2, use a ruler to measure the length of the rectangle in centimeters. Fill in the sentence.

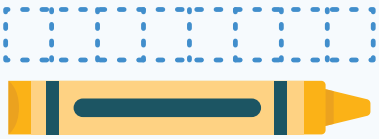


1 Rectangle A is _____ long.

2 Rectangle B is _____ long.

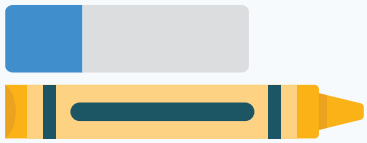
Summary | Lesson 4

You can use your understanding of 1 centimeter, 10 centimeters, or other objects of known lengths to help you make length estimates.



I pictured cubes lined up next to the crayon. The crayon looks about the same length as 8 centimeter cubes.

The crayon looks shorter than a 10-centimeter rod, so I think the crayon is 8 centimeters long.



The crayon is longer than the eraser that I know is 5 centimeters long, so I think the crayon is 8 centimeters long.

Try This

For Problems 1 and 2, use the rectangle. Fill in the sentence.

1 Estimate the length of the rectangle in centimeters.

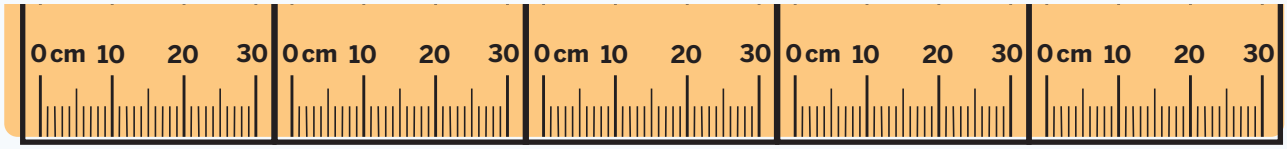
I think the length of the rectangle is about _____.

2 Measure the length of the rectangle in centimeters.

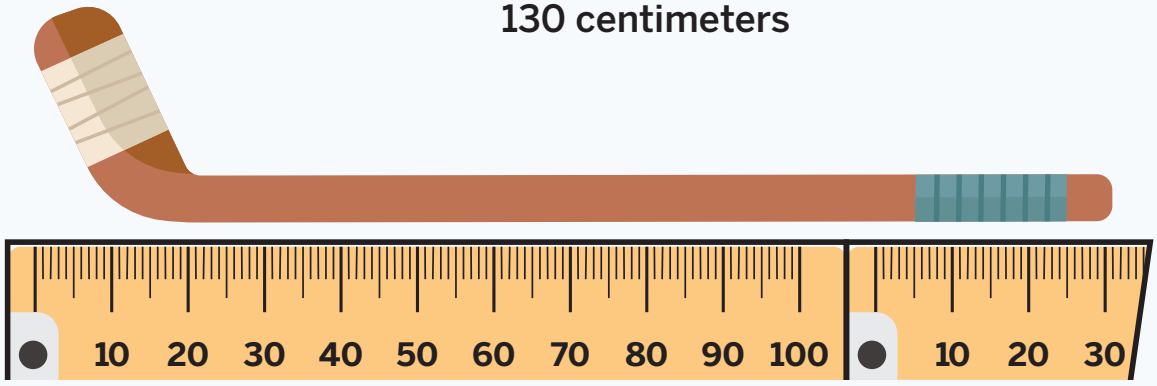
The length of the rectangle is actually _____.

Summary | Lesson 5

A **meter stick** is a longer measurement tool that can be used to measure objects in centimeters or **meters**. Using longer length units, such as meters, can be helpful when measuring longer objects.



130 centimeters



1 meter and 30 centimeters

Try This

1 Diego held a gecko at the zoo. The gecko fit in his hand. He measured the gecko and said it was 13 meters long. Do you think his measurement was correct? Explain your thinking.

Summary | Lesson 6

Story problems about comparing the lengths of objects are similar to story problems about comparing amounts. The unknown can be the length of the shorter object, the length of the longer object, or the difference between lengths.

$$76 - 52 = \_\_\_\_$$

Shorter length unknown

Jada's lizard is 76 centimeters long. Diego's lizard is 52 centimeters shorter than Jada's lizard. How long is Diego's lizard?

Smaller amount unknown

Jada has 76 books. Diego has 52 fewer books than Jada. How many books does Diego have?

Try This

Solve the story problem. Write 1 or more equations that represent the story problem and underline the answer.

Show or explain your thinking.

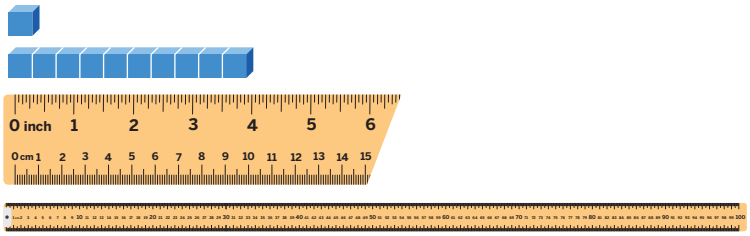
1. Lena measured her pets. Her cat is 19 centimeters shorter than her dog. Her cat is 33 centimeters long. How long is her dog?

answer: _____

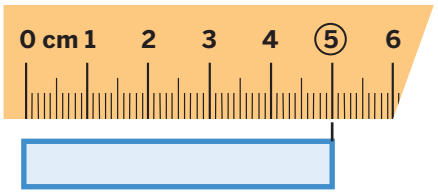
equation(s): _____

In this sub-unit . . .

- We estimated and measured the lengths of objects in **centimeters** and **meters**. We used different measurement tools, such as centimeter cubes, 10-centimeter rods, rulers, and meter sticks.



- We saw that **rulers** represent equal length units using numbered tick marks to show the distance in length units from 0.



Math tip: You can use a ruler to find the length of an object by lining up the edge of the object with the 0 on the ruler or by counting the number of length units between the endpoints of the object.

- We noticed the unknown amount in story problems involving measurement can be the length of the shorter object, the length of the longer object, or the difference between lengths.

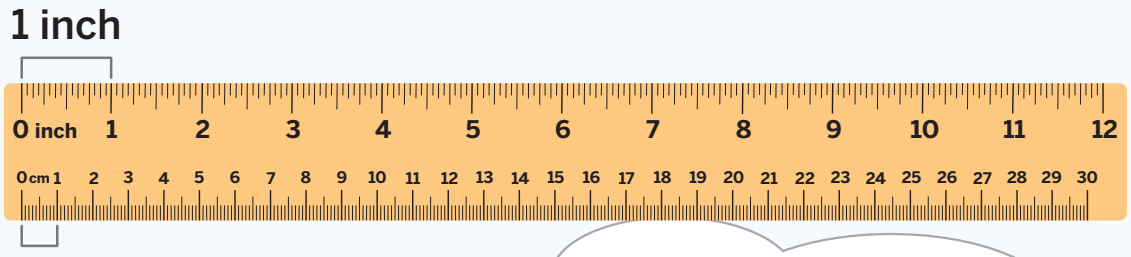
Jada's lizard is 76 centimeters long. Diego's lizard is 52 centimeters shorter than Jada's lizard. How long is Diego's lizard?

Shorter length unknown

76 − 52 = _____

Summary | Lesson 7

An **inch** is a standard length unit in the U.S. Customary system. An inch is longer than a centimeter, but much shorter than a meter. You can estimate the length of an object in different ways.



My estimate is that the pencil sharpener is about an inch long because it is about the same length as a paper clip.

Try This

For Problems 1 and 2, use a ruler to draw a line for the measurement.

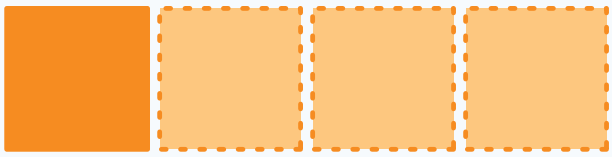
Draw

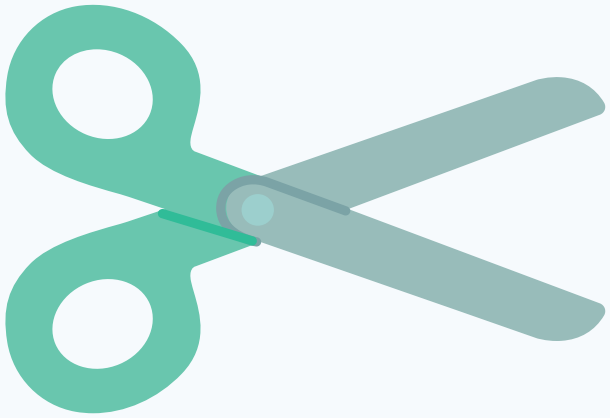
1 5 inches

2 1 inch

Summary | Lesson 8

You can make reasonable estimates of length by imagining a measurement tool, thinking about the length of the unit, or using the actual lengths of other objects.





I used the inch tile to help me make an estimate. I think the length of the scissors is about 4 inches long.

Try This

For Problems 1 and 2, use the picture of the paintbrush.

1 Estimate the length of the paintbrush in inches.

The length of the paintbrush is about _____ inches.

2 Measure the length of the paintbrush in inches using a ruler.

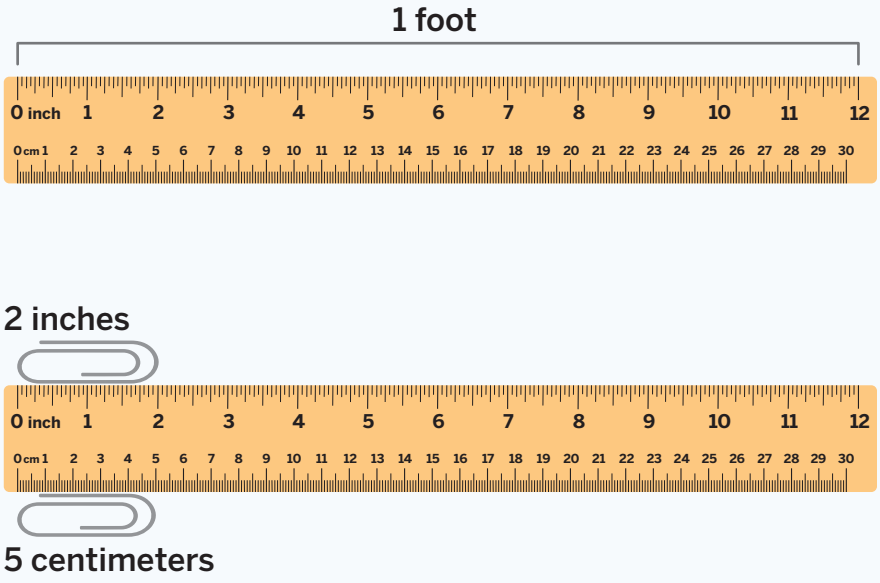
The length of the paintbrush is _____ inches.

Summary | Lesson 9

A **foot** is longer than 1 inch. 1 foot is the same length as 12 inches.

The shorter the length unit, the more length units it takes to equal the length of the object.

Each paper clip is 5 centimeters or 2 inches long.

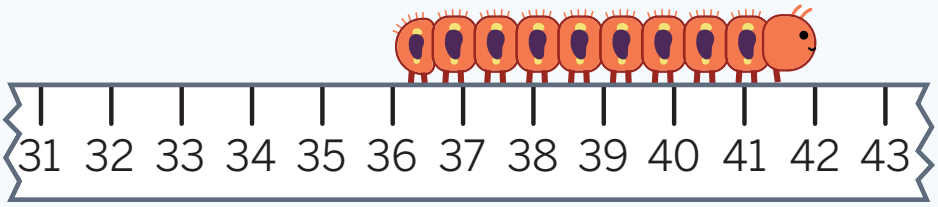


Try This

1 An adult hippopotamus is 13 units long. Are the units given as inches or feet? Explain your thinking.

Summary | Lesson 10

You can measure length without starting at 0 on a measurement tool by adding, subtracting, or counting the equal length units between the starting and ending points of the object. The length of the object will stay the same no matter where you start measuring.



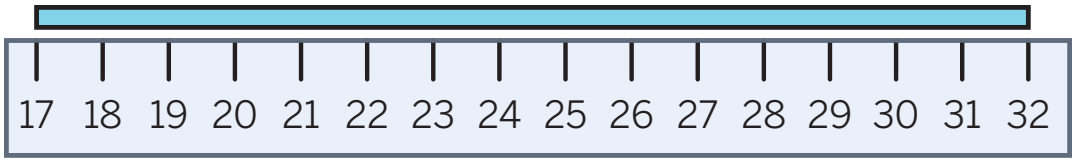
$36 + \_\_ = 42$ $42 - 36 = \_\_$

The caterpillar is 6 inches long.

Try This

1 Find the length of the rectangle in inches.

Show or explain your thinking.



answer: _____ inches

Summary | Lesson 11

Story problems involving length can have more than 1 unknown.

Lena found another flower garland that was 82 inches long. She did not need such a long flower garland. She cut a piece that was 25 inches long for Orson. Then she cut another piece that was 14 inches long for the set designer. How long is Lena's flower garland now?

Unknown 1	Unknown 2
What was the length of the flower garland after cutting the piece for Orson?	**What was the length of the flower garland after cutting a piece for the set designer?**

Try This

1 Solve the story problem. Write 1 or more equations that represent the story problem and underline the answer.

Lena was making a headband from a piece of fabric 71 centimeters long. She cut off 18 centimeters of the fabric. How long is Lena's piece of fabric now?

Show your thinking.

answer: _____

equation(s): _____

Summary | Lesson 12

You can use different equations to represent the relationships between amounts in a two-step story problem involving length.

Lena's flower garland was 27 centimeters long. Orson's flower garland was 15 centimeters longer than Lena's. How long are their flower garlands altogether?

$27 + 15 + 27 = 69$	$27 + 27 + 15 = 69$	$27 + 15 = 42$ $42 + 27 = 69$

Try This

1 Solve the story problem. Write 1 or more equations that represent the story problem and underline the answer.

Priya and Han worked together to make 1 long paper chain to hang in their classroom. The part Priya made was 24 inches long, and the part Han made was 32 inches long. Han accidentally ripped 12 inches off the chain. How long is their chain now?

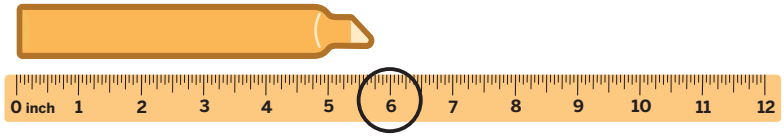
Show your thinking.

answer: _____

equation(s): _____

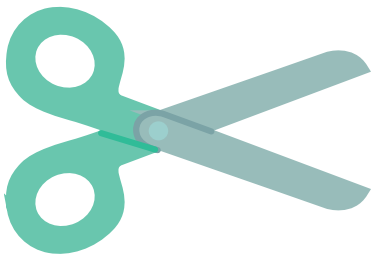
In this sub-unit . . .

- We estimated and measured the lengths of objects in **inches** and **feet** — 2 standard length units from the U.S. Customary system.



Math tip: If a measurement falls between 2 numbers on the ruler, choose the number closer to the end of the object as the measurement.

- We noticed we can make reasonable estimates of length by imagining a measurement tool, thinking about the length of the unit, or using the actual lengths of other objects.



I used the inch tile to help me make an estimate. I think the length of the scissors is about 4 inches long.

- We noticed story problems involving length can have more than 1 unknown amount.

Lena found a flower garland that was 82 inches long. She cut a piece that was 25 inches long for Orson. Then she cut another piece that was 14 inches long for the set designer. How long is Lena's flower garland now?

$82 - 25 = 57$

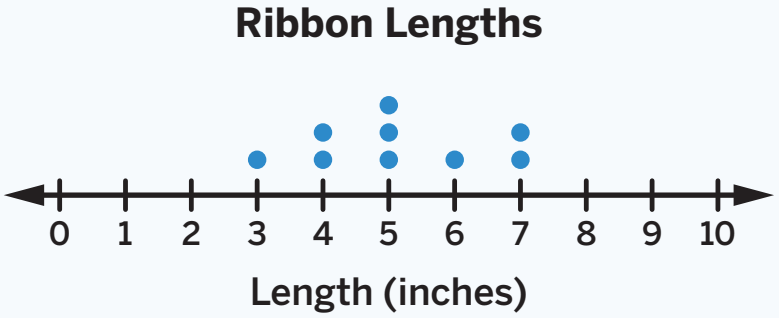
57 inches are left after cutting Orson's piece.

$57 - 14 = \underline{43}$

43 inches are left after cutting both pieces.

Summary | Lesson 13

Line plots use symbols to show the number of times each measurement occurs. Line plots can help you make sense of data collected from measuring the lengths of different objects.

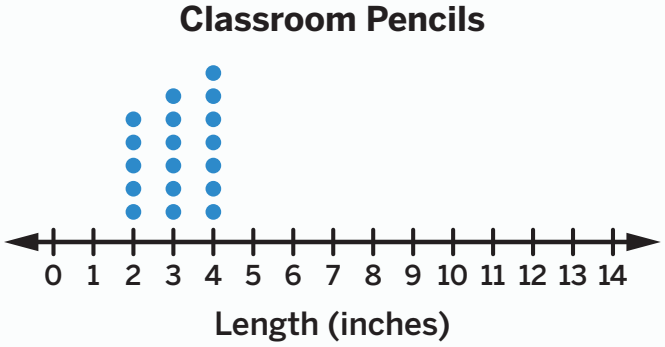


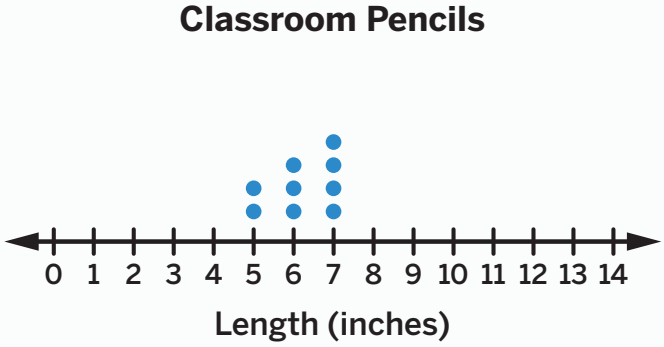
Try This

1 Clare collected data about the lengths of pencils in her class.

- 3 students have a pencil that is 6 inches long.
- 2 students have a pencil that is 5 inches long.
- 4 students have a pencil that is 7 inches long.

Circle the line plot that represents the data.

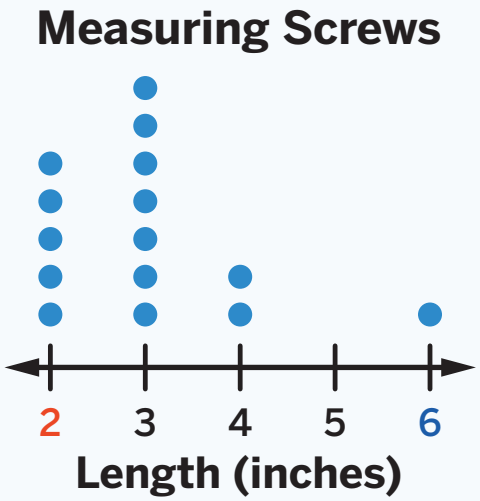




Summary | Lesson 14

Line plots show equal length units. You can look at the data to choose the starting and ending numbers of a line plot.

Screw lengths	Number of screws
1 inch	0
2 inches	5
3 inches	7
4 inches	2
5 inches	0
6 inches	1



Try This

1 Clare made new bracelets for her family. She wanted to know how long to make them, so she measured their old bracelets and recorded the measurements in the table shown.

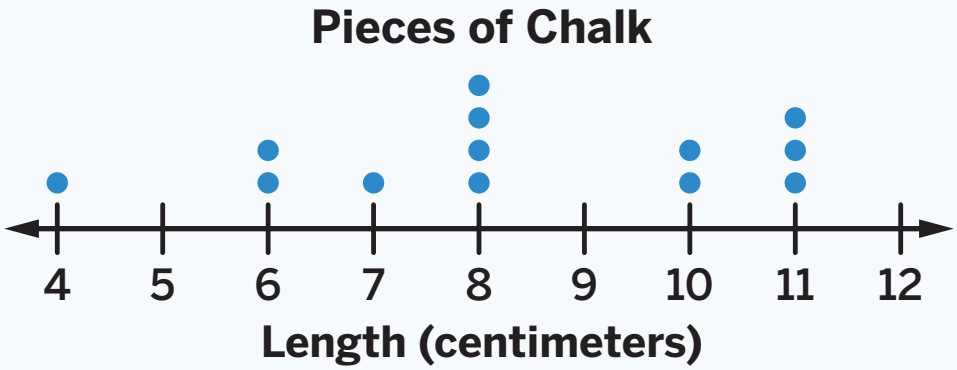
Name	Dad	Grandpa	Mom	Auntie	Lena	Papa
Length (inches)	7	10	8	8	6	6

Create a line plot to represent the length of each bracelet.

Draw

Summary | Lesson 15

Recording length data in line plots can help you make and justify real-world decisions. It is important to organize and include labels when making line plots so others can understand the data.



I need a box that has a length of 11 inches to fit all the pieces of chalk.

Try This

For Problems 1 and 2, use the line plot in the Summary.

1 What is the difference between the lengths of the *longest* and *shortest* pieces of chalk?

Show or explain your thinking.

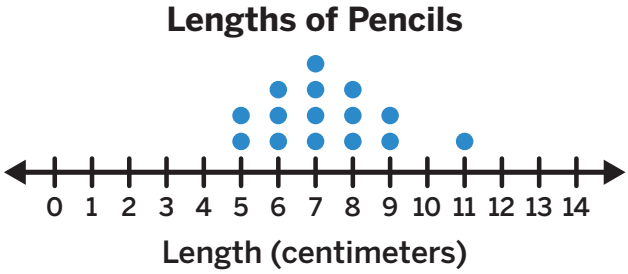
answer: _____

2 How many pieces of chalk are represented in the line plot?

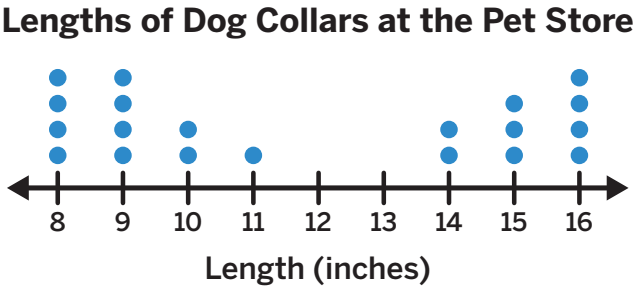
_____

In this sub-unit . . .

- We discovered a new way to represent measurement data. A **line plot** is a graph used to represent how many of each measurement.



- We made line plots that had:
  - Descriptive titles and unit labels.
  - Equally-sized symbols organized into rows and columns to represent measurements.
  - A labeled number line with equally-spaced numbers in order.



Math tip: A line plot can start and end at any number. You can use the data to choose the starting and ending numbers.

- We interpreted line plots and answered questions about the data. Some questions we can answer using line plots are:
  - How many objects were measured?
  - What is the length of the *shortest* object?
  - What is the most common length?
  - What is the difference in length between the *shortest* and *longest* objects?

Try This | Answer Key

Lesson 2

1 15

2 15

Lesson 3

1 14 centimeters

2 12 centimeters

Lesson 4

1 Sample response: 10 centimeters

2 9 centimeters

Lesson 5

1 Sample explanation: No. I know my hand is about 10 centimeters long, so I think he measured the gecko in centimeters, not meters.

Lesson 6

2 Sample work:

___ − 19 = 33
33 + 19 = ___

30 + 10 = 40
3 + 9 = 12
40 + 12 = 52

answer: 52 centimeters
equation: Sample response: 52 − 19 = 33

Lesson 7

1

2

Lesson 8

1 Sample response: 8

2 6

Lesson 9

1 Sample explanation: I think the units are feet because a hippopotamus is very long. 1 foot is a longer unit than 1 inch. If it was 13 inches, the hippopotamus would be about the size of a ruler.

Lesson 10

1 Sample work:

$32 - 17$

$32 - 20 = 12$

$12 + 3 = 15$

answer: 15

Lesson 11

1 Sample work:

$71 - 10 = 61$

$61 - 8 = 53$

answer: 53 centimeters

equation: Sample response: $71 - 18 = \underline{53}$

Lesson 12

1 Sample work:

$24 + 32 - 12$

$24 + 32 = 56$

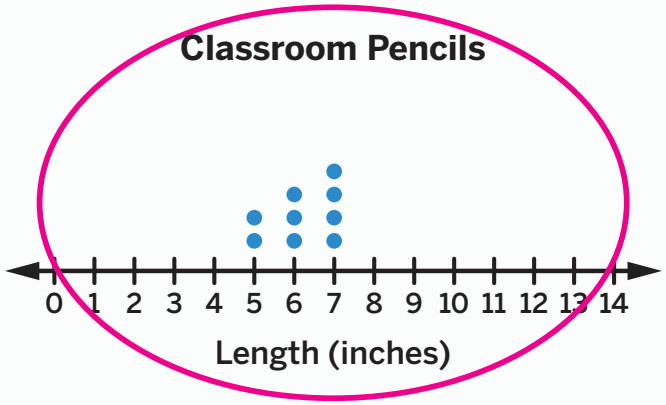
$56 - 12 = 44$

answer: 44 inches

equation: Sample response: $24 + 32 - 12 = \underline{44}$

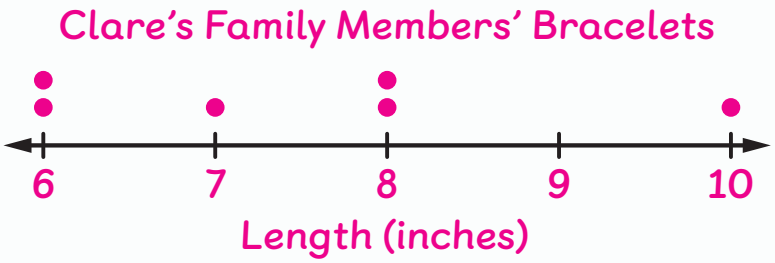
Lesson 13

1



Lesson 14

1 Sample response:



Lesson 15

1 Sample work:
$11 - 4 = 7$
answer: 7 centimeters

2 13 pieces of chalk